The small ulcers occurring high up on the lesser curve still, however, present an unsettled problem. The patient can be cured, it is true, by partial gastrectomy, but the

FIG. V.—Schoumaker gastrectomy. Result after six months.

large section of stomach sacrificed seems scarcely justifiable. In the ingenious method of Schoumaker the portion of stomach excised can be greatly reduced, and the operation is so performed that a stomach is left which is almost normal in appearance and function. (See Fig. V.) The operation, however, is technically difficult, and an equally good result is more easily obtained if the stump of the

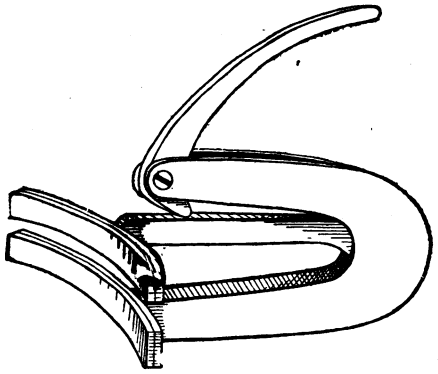

FIG. VI.—Gastrectomy clamp.

stomach is anastomosed to the jejunum, as in Polya's operation.

To facilitate this procedure I have devised a clamp based on that of Schoumaker, but of simpler construction. (Fig. VI.) It consists of two members joined to one another, which can be forced together with great power by a toggle lever. On the front of each member is a

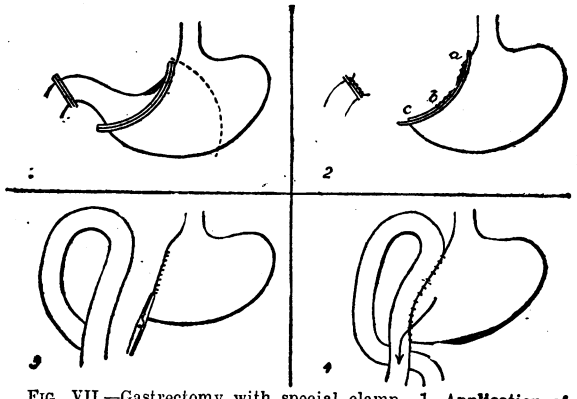

FIG. VII.—Gastrectomy with special clamp. 1, Application of clamp. 2, Stomach excised, front members of clamps removed, crushed edges sutured. 3, Clamp removed, Lembert sutures inserted, forceps applied to stoma. 4, Operation completed. New lesser curve protected by jejunal loop, which is itself protected from angulation.

detachable face. After crushing the stomach, amputating, and removing these faces, a fringe of crushed tissue projects which can be sutured with great facility, and in almost perfect asepsis. The clamp is used as follows.

After dividing the duodenum and freeing the stomach the clamp is so applied as to allow of the removal of the ulcer with a minimum of stomach. The rejected tissue is now cut away, and the fringe of tissue in the clamp is touched with pure carbolic. The front plates of the clamp are removed, the upper two-thirds of the crushed tissue edge is sutured, and the lower third is caught in forceps. The clamp is removed and the suture line is invaginated. A loop of the jejunum is now brought up to the stomach and attached all along the suture line, whilst an anastomotic opening is formed in the usual way between the jejunum and the portion of the stomach stump held in the forceps. (See Fig. VII.)

The operation has the advantages that it is very tidy and clean, that very little stomach need be removed, that the alignment of the jejunum along the suture line prevents this from leakage, and protects the jejunum from kinking, and that the outlet from the stomach is reduced to dimensions approaching the normal. On the other hand, the dotted line shows how the same method can be applied to the most extensive gastrectomy for carcinoma. The operation is followed by a convalescence remarkable for its smoothness, and so far the after-results have been unexceptionable.

HEREDITARY FAMILIAL CONGENITAL HAEMORRHAGIC NEPHRITIS.

BY

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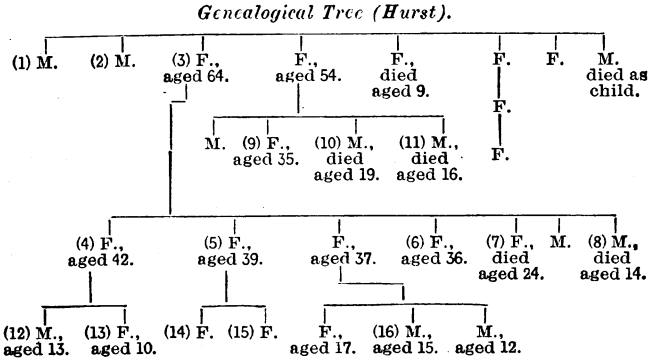
THE question of heredity as an etiological factor in nephritis has been studied and reported upon from time to time. Fortunately the condition is rare, and the literature shows only half a dozen families affected in this way. As far back as 1875 Dickinson[1] published a family tree showing eleven cases of albuminuria in a total of sixteen persons in three generations. Attlee,[2] Guthrie,[3] and later Hurst,[4] Pel,[5] and Kidd,[6] and Eason, Malcolm Smith, and Buchanan[7] have also described the disease and noted its familial and hereditary tendency.

The cases which have come to my notice belong to a later generation of the series studied by Leonard Guthrie and Hurst, and it is with this family I propose to deal. Guthrie designated the condition "idiopathic or congenital hereditary family haematuria," and used the word "haematuria" rather than nephritis. He gave as his reasons for this that it is "persistent for many years, but may vary in extent; liable to paroxysmal exacerbations with influenzal-like symptoms; not marked by oedema, ascites, or cardio-vascular disturbances; not due to uric acid or oxalates, and is not accompanied by urine of low specific gravity."

The part of the same family described by Hurst showed definite nephritis with low specific gravity of urine and the presence of albumin, some blood, and granular and hyaline casts; the blood pressure was increased, and towards the end anaemia, cardio-vascular changes, and oedema were marked features; these cases terminated in death from uraemia. Hurst thus named the condition "hereditary familial congenital haemorrhagic nephritis," and this terminology is accurate for most of the affected members of the later generations of the family.

Genealogical Tree (Hurst).



The genealogical tree is taken from Hurst's study of the family records, with the addition of the children of the third generation, born since his original communication appeared.

On January 4th, 1924, I was asked to see a boy belonging to the third generation of this family—No. 16 in Hurst's genealogical tree and the second child of the third daughter of No. 3. This boy's great-grandmother, not shown on the genealogical tree, lived to the age of 90 years and was extremely deaf. Her daughter (No. 3) had a severe attack of haematuria after the birth of her first child, and similar, but less severe, attacks after the births of her younger children and also after eating black currants and drinking claret. She is very deaf, but her general health is excellent. Her two elder brothers both suffered from haematuria and died in childhood. One sister is deaf and another slightly so, but they do not suffer from disease of the kidneys.

All her children, with the exception of one male child, developed haematuria. In three cases (Nos. 5, 6, and 7) the condition followed the consumption of black currants. In one case (No. 8) black currants did not affect the patient, but strawberries, asparagus, and catching cold or influenza brought on attacks. A female child (No. 7) was deaf, and died in her twenty-fifth year; a male (No. 8), who died at the age of 14, was also very deaf. Another female (No. 6) is not dead as stated in Hurst's genealogical tree. She is alive and quite well except for her attacks of haematuria, but is stone deaf. Case No. 4 is slightly deaf. Two nephews (Nos. 10 and 11), deceased, suffered from nephritis and deafness. Her third daughter, unnumbered, the mother of my patient, denies having had haematemesis as stated in Eason, Malcolm Smith, and Buchanan's article, but suffers from backache and attacks of blood and albumin in the urine. She has only had one "bad attack," when she passed "pure blood." Her eldest child, a daughter, is quite free from the disease, and her younger son has shown no definite signs. The second child, a boy (No. 16), has nephritis and some nerve deafness. His case is fully described below. Her eldest sister (No. 4) has two children; both of these (Nos. 12 and 13) are well grown and in good health, but suffer from the complaint. Their cases are also described below. The children (Nos. 14 and 15) of her second sister (No. 5) are not affected.

It will be seen from this that nearly all the children of three generations of one family suffer from haematuria or nephritis associated with deafness. The deafness, which has not been stressed in the literature on the subject, is one of the most distressing features of this extraordinary disease.

Mr. J. Gay French has kindly supplied me with the following information on the deafness of two of the cases belonging to the first generation of the family, as shown in Hurst's genealogical tree. In 1916 he examined both of these patients and found them to be suffering from nerve deafness; the hearing in one of them has become slightly worse since then.

This nerve deafness is apparently the type of defective hearing to which members of this family are subject. It occurs not only in the individuals who have nephritis or haematuria, but also in those who are otherwise perfectly healthy.

When I first saw Case No. 16, in 1924, he was 14 years of age, tall for his age, intelligent, and keen on sport of all kinds. The apex beat was well within the mid-clavicular line, the heart sounds were normal, and there were no bruits. The vessels were not thickened, systolic blood pressure 118 mm. Hg, diastolic 55 mm. Hg. The urine, specific gravity 1015, was acid with a fair amount of albumin and some blood. Microscopically numerous red blood corpuscles, a few granular casts, and a large number of uric acid crystals were seen. The culture of a catheter specimen of urine was negative. Urea concentration test (Maclean) 2.5 per cent. of urea. Blood count: red blood corpuscles 5,120,000, haemoglobin 80 per cent., colour index 0.88—a slight secondary anaemia. Leucocytes were diminished in number. Differential count: polymorphonuclears 27.5 per cent., small lymphocytes 59 per cent., large lymphocytes 9 per cent., hyalines 2.5 per cent., eosinophils 1.5 per cent., and transitionals 0.5 per cent. The patient also suffered from nerve deafness to a considerable degree in both ears. The treatment was to reduce the food proteins and to give sufficient potassium citrate to render the urine neutral in reaction and allay the possible kidney irritation, due to the presence of uric acid crystals.

In May, 1924, the general vascular and urinary conditions showed no appreciable change. The blood urea was 12 mg. per 100 c.cm., albumin 0.075 per cent. Because of the definite family history of attacks of haematuria occurring after eating black currants, strawberries, and asparagus, I tested his skin reaction to various protein groups with a view to desensitizing him, should he prove sensitive to any given protein. The results were comparatively disappointing. He showed a ++ reaction to fish, fowl, and leaf vegetables—cabbage, lettuce, etc.—but the elimination of these from his diet and treatment with medicinal peptone, 1 grain one hour before breakfast, daily for a month, failed to diminish the albumin and blood in his urine to any extent.

In July, 1924, he developed furuncles in the external meatus of each ear and on one cheek. They cleared up after a course of injections of an autogenous staphylococcal vaccine. The urine still contained albumin 0.05 per cent. and blood corpuscles microscopically. He played football throughout the following winter, and in April, 1925, showed considerable improvement—heart normal; systolic blood pressure 108 mm. Hg, diastolic 65 mm. Hg; blood urea 27 mg. per 100 c.cm.

In September, 1925, he had an attack of influenza, and this was followed by a large increase of blood and albumin in the urine. The coagulation time of his blood was found to be five minutes—showing a delay. Treatment with calcium lactate 15 grains twice a day for three months had little or no effect upon the coagulation time or upon the urinary condition. Although I was anxious not to interfere unduly with the general routine of his life at school, I refused to allow him to play football last winter, because of the possibility of an onset of uraemia following a chill.

On April 7th, 1926, I saw him again and tried the effect of intravenous injections of 1 grain of calcium chloride, followed by further injections on April 14th and 24th. After each of these the urine showed decided improvement, there being considerably less albumin and blood in it and no casts. The coagulation time of the blood was reduced to three and three-quarter minutes. Further attempts to find a cause for the condition have proved unavailing. The Wassermann reaction and the complement fixation test for tubercle are both negative. An examination of the pharynx and nose by Mr. Cecil Graham proved negative; the tonsils had been removed some years ago and there were no adenoids. On transillumination of the right antrum of Highmore, however, a dark shadow was found below the right eye and light was less appreciated by the patient in that eye than in the left. An exploratory operation, the washing out of the antrum with sterile water and the culture of this fluid, failed to yield an organism of any kind. An *x*-ray photograph taken a week after the operation shows the right antrum still very opaque; there is no apparent explanation of this.

A further effort to find some focus of infection resulted in the cultivation of a non-haemolytic streptococcus (*S. viridans*) from the stools.

Buchanan, in his investigation of the blood and urine of two of Eason's cases, found pure growths of non-haemolytic streptococci. These were biochemically identical with those obtained from the teeth, tonsils, and tonsillar regions of the patients. Buchanan states that "a feature of note in primary cultures was the delay and feeble nature of the growth, which only appeared between the third and sixth days of incubation." He also produces experimental evidence of the production of symptoms of acute nephritis in rabbits as the result of intravenous injections of non-haemolytic streptococci (*S. faecalis*) obtained from two cases of subacute nephritis. Albumin in considerable quantity appeared in the urine within the first week of inoculation. In some cases it increased daily in amount and persisted until the animals died, in others it gradually decreased and almost disappeared. Microscopically the urine of these animals showed hyaline, granular, epithelial, and blood casts and blood epithelial cells were very numerous. In some animals which succumbed shortly after inoculation an accumulation of fluid in the pericardial sac and abdominal cavity was a marked feature, and the kidneys presented the typical microscopical changes associated with acute diffuse nephritis.

In view of these observations I injected into the veins of two rabbits a large dose of a first subculture of the non-haemolytic streptococcus (*S. viridans*) obtained from the stools of my patient by Dr. Fleming of the Pathological Institute of St. Mary's Hospital. The results were negative; the rabbits showed no symptoms of any kind, the temperature remained normal, and an examination of the urine ten days and a fortnight after the injections showed no signs of albumin, blood, or casts. The animals were still perfectly fit a month later. Another culture made recently from the stools of this case showed an abnormal number of *S. faecalis* and a few colonies of haemolytic streptococci.

Towards the end of last summer two cousins of this patient were brought to me. They were over on holiday from California, where they had been advised to live because they are suffering from the family disease.

The boy (No. 12), according to the mother's statement, developed haematuria when he was 2 years old. On examination he was found to be well grown; his systolic blood pressure was 122 mm. Hg, and the diastolic 78 mm. Hg, with slight thickening of the arteries. The heart was not enlarged and there were no bruits. The urine contained 0.28 per cent. of albumin and a trace of blood. Microscopically it showed an occasional blood and epithelial cell, but

no casts. The blood urea was 26 mg. per 100 c.cm., and the urea concentration was 1.95 per cent. Cultures from faeces yielded colonies of *S. viridans* only: 1 c.cm. of a first subculture of the living organism was injected into the veins of a rabbit; the urine collected and tested three weeks later was normal. Microscopical examination of the kidneys showed nothing pathological.

The girl (No. 13) had a history of haematuria, commencing three weeks after birth. Her systolic blood pressure was 118 mm. Hg, diastolic 75 mm. Hg. The heart was not enlarged, there were no bruits, and the arteries were normal. There was only a trace of albumin in the urine, which was faintly positive to chemical tests for blood. Microscopically a few red corpuscles, some uric acid crystals, and one hyaline cast were seen. The blood urea was 17 mg. per 100 c.cm.; urea concentration test 2.1 per cent. Culture from faeces yielded numerous *S. viridans*, and a few colonies of a haemolytic streptococcus appeared on the plate; 1 c.cm. of a living subculture of the above was injected into the veins of a rabbit and the urine collected and examined three weeks later. It showed a faint trace of albumin on boiling, and microscopically a few red corpuscles, numerous pus cells, but no definite casts. Culture of a fresh specimen of the urine failed to produce any streptococcal colonies. The rabbit was then killed by chloroform, and the kidneys examined by Dr. Newcombe, who reported as follows: "Glomeruli rather swollen and some of them contain a small amount of albuminous exudate. No sign of leucocytic infiltration. Tubules show some early fatty degeneration."

The small dose of streptococci given, and the shortness of time intervening between the injections and the microscopical examinations, may account for the relatively slight changes found in the kidneys.

Other cases of nephritis occurring in a family may be of interest.

At the beginning of May, 1924, two brothers, Charles J., aged 17, and Harry J., aged 14, were admitted to the Medical Unit wards of St. Mary's Hospital suffering from general oedema, blood and albumin in the urine, and an increase of blood pressure. They had been delivering milk early one morning; both got wet through and cold, both developed symptoms of nephritis, and they were admitted on the same day. There was no evidence of any infection immediately preceding the onset in either case. They both had scarlet fever five years before admission, and the elder brother had had measles, diphtheria, and chicken-pox as well. There was no history of oedema or albuminuria following these attacks.

The mother states that her father, an uncle, and her grandmother died of cancer, while her grandfather, two uncles, and an aunt died of consumption. There was, however, no family history of kidney disease. The elder boy proved to be a case of acute nephritis. On admission his renal efficiency was impaired —blood urea 0.056 per cent.; urea concentration test 1.6 per cent. After treatment the blood urea fell to 0.041 per cent.; urea concentration test 2.75 per cent. of urea. He has been discharged, and has been in the best of health ever since.

The condition of the younger boy on admission was more severe. He had considerable oedema, with albumin, blood, and casts in the urine. The apex beat was in the mid-clavicular line, but there was no bruit. The systolic blood pressure was 160, diastolic 100. The fundi were normal. Blood urea 0.146 per cent., urea concentration 1.7 per cent. The picture was one of chronic parenchymatous nephritis with considerable interstitial changes, progressing towards small white kidney. He was discharged relieved some weeks later.

On readmission in October, 1924, his condition had deteriorated considerably. Oedema, drowsiness, headache, and nausea were marked features. The breath smelt urinous. The apex beat was 1½ inches to the left of the mid-clavicular line, extra-systoles were present, but no bruits. The urine was scanty, and contained 0.8 per cent. albumin, granular and hyaline casts, but no blood. Urea concentration 1.35 per cent., blood urea 0.240 per cent. In the end he developed pericarditis and died on February 16th, 1925. *Post mortem* small white kidney was found.

COMMENTS.

1. Hereditary familial or congenital nephritis is a definite entity, and the kidneys in these patients are more susceptible to damage by the toxin of an unknown organism than is the case in the normal person.

2. The organism probably belongs to the streptococcal group.

3. In the first case investigated (No. 16) the coagulation time of the blood was delayed; intravenous injections of 1 grain of calcium chloride reduced the coagulation time and caused a reduction in the amount of blood and albumin in the urine. Calcium lactate given by the mouth is useless, as it is not absorbed by the intestines.

4. Cultures of *Streptococcus viridans* found in the stools of this patient, and of his cousin (No. 12), failed to produce the disease when introduced into the veins of a rabbit. Cultures of the stools of another case (No. 13), which showed both *S. viridans* and haemolytic streptococci, caused changes in the urine and kidneys of a rabbit after intravenous injections.

5. Deafness is a marked feature in nearly all these cases.

6. The male members of a family tend to develop nephritis and deafness and do not as a rule survive. The females have deafness and haematuria and live to old age.

7. The last couple of cases are interesting evidence of the variations in the course of nephritis. The kidneys of two members of the same family were attacked, apparently by the same organism, at the same time, and under exactly the same conditions. The elder brother contracted acute nephritis, which cleared up completely, the younger developed parenchymatous nephritis, passing into small white kidney, and ending in death.

I am indebted to Professor Langmead of the Medical Unit, St. Mary's Hospital, for leave to publish the notes on the last two cases.

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THE SCHICK TEST:

ITS APPLICATION IN AN INSTITUTION FOR MENTAL DEFECTIVES.

BY

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THE intradermal reaction in guinea-pigs was first used by Romer in 1907 for carrying out virulence tests in diphtheria. His technique was supplemented in 1913 by Schick, who introduced a test known by his name. It is possible by means of this test to determine whether or not an individual is susceptible to an attack of diphtheria. I have carried it out by injecting into the substance of the skin 0.2 c.cm. of standardized diphtheria toxin into the left arm. The most favourable site is the flexor aspect. The best results are obtained by using an "Agla" all-glass syringe (Burroughs Wellcome) fitted with a No. 214 rustless needle. The needle is inserted intracutaneously for a distance of an eighth of an inch. If the injection has been accurately effected considerable force is necessary to move the plunger onwards. After the injection has been done a wheal about half an inch in diameter is visible which is caused by the pitting of the hair follicles. A corresponding dose of heated toxin is injected into the opposite forearm. A separate syringe is used for this control dose.

Four types of reaction may be observed, and in 90 per cent. of cases in healthy subjects the results may be read after twenty-four hours, though after thirty-six to forty-eight hours the reactions are clearer.

1. *Negative.*—After twenty-four hours both arms show no local reaction except a puncture where the needle was inserted. There may be slight transient redness due to trauma. This coloration fades in the course of twelve to twenty-four hours.

2. *Positive.*—At the end of twenty-four hours there is seen at the site of the injection a circumscribed area of redness which varies from a quarter of an inch to one inch in diameter. It attains its maximum intensity by the fourth day, and thereafter gradually fades, leaving a brownish pigmentation. Persons who show this reaction are susceptible to diphtheria if exposed to infection.

3. *Negative and Pseudo-reaction.*—There is a red flush with a dark centre; the characteristic is that the area of redness is equal or approximately equal on both forearms. The patient who shows this reaction is immune to diphtheria if exposed to infection. It is due to some unknown constituent in the toxin broth.

4. *Positive and Pseudo-reaction.*—In this case a pseudo-reaction is observed in addition to the positive reaction. A red flush appears on both arms. The flush, which is much larger on the test arm than on the control, lasts for a longer time. The reading of this arm is best seen on the fourth to sixth day. The reaction is rather rare.